COMPLETE ENERGY CONSULTANCY

Tel: 01453 799329/07771 964593
E richard@completeec.co.uk
www.completeenergyconsultancy.co.uk

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Complete Energy Consultancy – Complete Building Regulation compliance under one roof.

FAO: Freemantle (e mail only)

Energy Statement – Units 1-21, Oaklands Drive, Almondsbury, BS32

The relevant planning policies are:

Policies, Sites and Places (PSP) Plan Policy 6 "On site renewable and low carbon energy" (Adopted November 2017).

Core Strategy Policies (Adopted December 2013):

o CS1(8) "High Quality Design";
o CS3 "Renewable and Low Carbon Energy Generation"; and
o CS4 "Renewable or Low Carbon District Heat Networks"

Sustainable Drainage System and Water Conservation

Surface water

- All surface water from roofs will be taken to a SUDS system where possible. Full calculations will be provided by a suitably qualified professional.

- All hard landscaping surrounding the new units will be semi permeable.

Waste management

- A site waste management plan compliant with WRAP standards will be formulated and adhered to on site during construction.

Site layout and building design

- Excessive solar gain in summer is not anticipated but will be modelled to check for compliance. If measures are required they may include external shading, additional natural ventilation, secure ventilation for night cooling, additional thermal mass.

Building Regulations

- The development will be designed to meet the increasingly challenging energy performance standards required by Building Regulations, Part L 2021. Full SBEM calculations will be provided as part of the Building Control process which will demonstrate compliance with current standards.

Building for the future

- Measures have been taken to make sure the development will be resilient to predicted future climate conditions, e.g. hotter summers, wetter winters, more storms and flooding, increased risk of soil subsidence. This has been achieved through the specification and modelling to prove suitable thermal mass.

- The scheme shows consideration of the need to use materials with a reduced energy input e.g. considering the re-use of existing buildings onsite materials, recycled materials, or through reference to BRE Green Guide. This will be achieved through the production and implementation of a Site Waste Management Plan whereby at least 50% of waste will be diverted from landfill. BRE Green Guide A rated materials will be specified wherever possible.

- The scheme shows consideration of the need to design buildings which will be adaptable in future in terms of their use and the future incorporation of energy saving technologies.

Renewable Energy

Solar Hot Water (Thermal)

Solar water heating systems are one of the more familiar renewable technologies used at the moment.
They use the energy from the sun to heat water, most commonly for hot water needs. Solar heating systems use a heat collector that is usually mounted on a roof in which a fluid is heated by the sun. This fluid is used to heat water that is stored in either a separate hot water cylinder or in a twincoil hot water cylinder (the second coil is used to provide additional heating from a boiler or other heat source).

Wind turbines

These units convert the kinetic energy in wind into mechanical energy that is then converted to electricity. Turbines are available in a range of sizes and designs and can either be free-standing, mounted on a building or integrated into a building structure. For a development in this location only a building mounted turbine could be considered however due to the character, aesthetics and location of the building it would not be feasible. In addition the windspeed in the area is under the advised minimum.

Photovoltaic (PV)

Panels Photovoltaic (PV) modules convert sunlight directly to DC electricity. The solar cells consist of a thin piece of semiconductor material, in most cases of silicon. Through a process called doping, a very small amount of impurities are added to the semiconductor, which creates two different layers called n-type and p-type layers. Certain wavelengths of light are able to ionise the silicon atoms, which separates some of the positive charges (holes) from the negative charges (electrons). The holes move into the positive or p-layer and the electrons into the negative or n-layer. These opposite charges are attracted to each other, but most of them can only re-combine by the electrons passing through an external circuit, due to an internal potential energy barrier. This flow of electrons produces a DC current. PV panels could be mounted to roof slopes.

Biomass energy systems

These are based on either the direct or indirect combustion of fuels derived from those plant sources. The most common form of biomass is the direct combustion of wood in treated or untreated forms. The use of biomass is becoming increasingly common in some European countries (some countries such as Austria are heavily dependent on biomass). The environmental benefits relate to the significantly lower amounts of energy used in biomass production and processing compared to the energy released when they are burnt. This can range from a four-fold return for biodiesel to an approximate 20-fold energy return for woody biomass. Biomass-fuels can be used to produce energy on a continuous basis (unlike renewables such as wind or solar energy) and it can be an economic alternative to fossil fuels as it is a potential source of both heat and electricity. However Biomass systems have particular design management and maintenance requirements associated with sourcing, transportation and storage and are therefore more commonly used in commercial developments rather than domestic installations. It can be less convenient to operate than mains-supplied fuels such as natural gas and are more management intensive and require expertise in facilities management. Sources of biomass can also fluctuate, so boilers should be specified to operate on a variety of fuels without risk of overheating or tripping out. A communal biomass system would not be feasible for this development due to use, space and maintenance issues. The system would be quite large and there is very little space around the property to locate the boiler, hopper and fuel store that is suitable for deliveries but also appropriate for feeding the boiler.

Ground Source Heat Pumps.

A heat pump is a device that takes up heat at a certain temperature and releases it at a higher temperature. The essential components of a heat pump are heat exchangers (through which energy is extracted and emitted) and a means of pumping heat between the exchangers. The effectiveness of the heat pump is measured by the ratio of the heating capacity to the effective power input, usually known as the coefficient of performance (COP). Ground-source heat pumps (GSHP) extract heat from the ground. They are classified as either water to-air or water-to-water units depending on whether the heat distribution system in the building uses air or water. Ground source heat pumps either use long shallow trenches or deep vertical boreholes to take low grade heat from the ground and then compress it to create higher temperatures. Ground source heat pumps would not be suitable due to the lack of land space around the property.

Air Source Heat pumps

Air source heat pumps absorb heat from the outside air. This is usually used to heat radiators, under floor heating systems, or warm air convectors and hot water in your home. An air source heat pump extracts heat from the outside air in the same way that a fridge extracts heat from its inside. The system performs down to air temperatures of -20°c which means that they are more than suitable for installations within the UK. Hot water and Heating can be provided 365 days a year. The hot water is produced without the aid of electrical immersions and at 55°c is more than hot enough for baths and showers. There are two main types of air source heat pump system: An air-to-water system distributes heat via your wet central heating system. Heat pumps work much more efficiently at a lower temperature than a standard boiler system would. So they are more suitable for under-floor heating systems or larger radiators, which give out heat at lower temperatures over longer periods of time. An air-to-air system produces warm air which is circulated by fans to heat your home. They are unlikely to provide you with hot water as well. Air Source heat pumps would be feasible.

In summary:

1. **A fabric first approach has been taken with the intention of minimising the amount of energy the end user will require. These are measures that are 'in built' and cannot be removed or 'switched off'.**

   U values are as follows:

- **Ground floor – 0.10**
- **External walls – 0.15**
- **Roofs – 0.15**
- **External windows & doors – 1.2**

2. **Mains electric air source heat pumps have been specified.**
3. **Solar PV has been specified**

Compliance Tables:

ENERGY TABLE 1:		Energy (kWh per year)	CO_2 emissions (kg per year)
A	**Projected annual energy demands for heat and power, and associated CO_2 emissions:** **Regulated energy** - to calculate projected regulated energy the Target Emissions Rate (TER)[1] should be used. This is set through Part L of the Building Regulations at the time of full application or reserved matters approval.	36681	5268
B	**Projected annual energy demands for heat and power, and associated CO_2 emissions:** **Unregulated energy** - the latest Building Regulations Standard Assessment Procedure for Energy Rating of Dwellings (SAP) methodology (currently SAP 2012, which includes guidance in Section 16[2] on estimating energy use for cooking and appliances) should be used to calculate projected unregulated energy use.	11364	5898

[1] ***Note:*** *the TER is the minimum standard required in Part L of the Building Regulations for regulated energy use. It is based on a 'notional dwelling' with set values for building fabric and a gas heating system. The Dwelling Emission Rate (DER) must not exceed the TER. This information is also compiled by applicants in order to comply with Building Regulations.*

[2] ***Note:*** *the relevant equations are L14 and L16 which cover electrical appliances and cooking respectively (refer to Appendix L of the SAP).*

C	**Total Projected annual energy demand and CO_2 emissions arising from regulated and unregulated energy demands = A+B**	**48046**	**11166**
D	**Additional energy efficiency measures reducing energy demand and associated CO_2 emissions (that exceed compliance with Part L (Building Regulations).** This records the impact of measures that are being incorporated into the design to meet the first part of Policy 6, and that go over and above those required by the current Building Regulations**.** These measures normally relate to the building fabric, but could also include other measures such as reductions in air permeability, and connection to a district heat network.	34966	3835
E	**Total residual energy consumption and associated CO_2 emissions = C-D** This includes regulated energy use (space heating, hot water, lighting and ventilation) and unregulated energy use (appliances and cooking). **BASELINE FOR CALCULATING COMPLIANCE WITH POLICY 6**	**13080**	**7331**
F	**Reduction in energy demand and CO_2 emissions from renewable heating system included in the design** For example: air/ground/water source heat pumps, solar thermal, micro-heat networks, etc. (connection to District Heat Network is not included here as it is counted under Row D above).	1829	164
G	**Reduction in energy demand and CO_2 emissions from renewable energy generation sources included in the design** For example: solar photovoltaic (PV) panels	10014	1462
H	**Total Reduction in energy demand and CO_2 emissions from renewable heating and renewable energy generation = F+G**	**11729**	**1626**
I	**Reduction in energy demand and CO_2 emissions from renewable heating and renewable energy generation expressed as a percentage of the baseline.**	**118**	**22.00**

ENERGY TABLE 2: List of renewable technologies to comply				
Technology type (e.g. Air Source Heat Pump, Solar PV*, solar thermal, biomass)	**Description**	**Planned installed capacity from this technology (kW)**	**Estimated annual generation* (kWh)**	**Total CO_2 saving from this technology ($kgCO_2/yr$)**
ASHP	ASHP	26 kW	19565	357
Solar PV	Solar PV	13 kW	10014	1269
TOTAL				

*****for solar PV, the impact of shading (Shading factor) should be calculated using the Standard Estimation Method as detailed in the current Microgeneration Certification Scheme guidance.*

Report compiled by:

[redacted]

Mr Richard Britton BSc (Hons)